July 20, 1948. A. F. BUTCH 2,445,472

SUPPORT AND TRACTION OF IMPLEMENTS

Filed Aug. 24, 1944 3 Sheets-Sheet 1

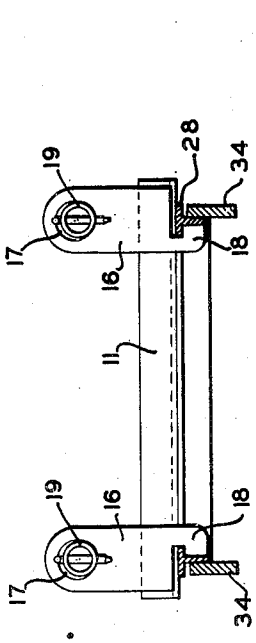


Fig. 3.

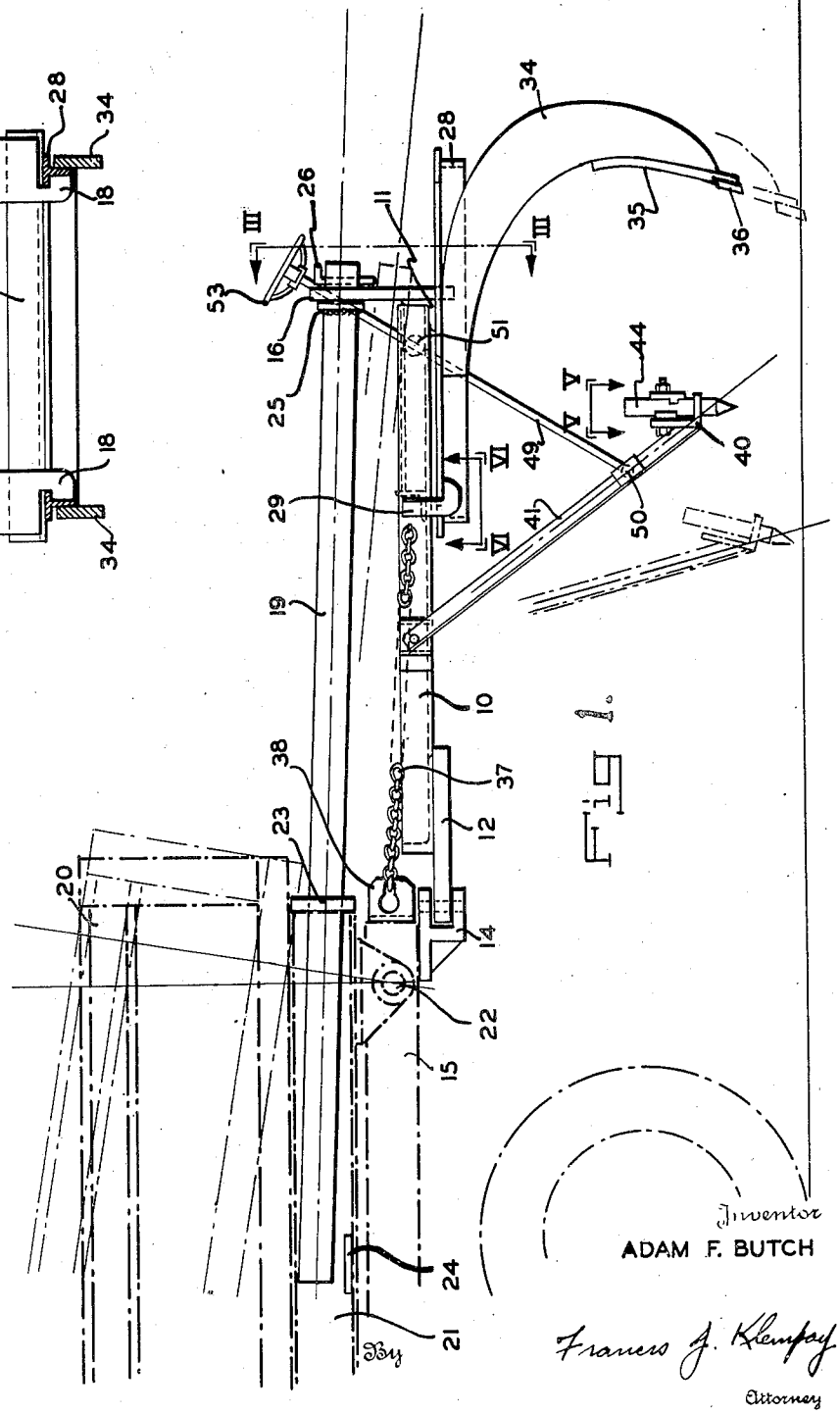


Fig. 1.

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SUPPORT AND TRACTION OF IMPLEMENTS

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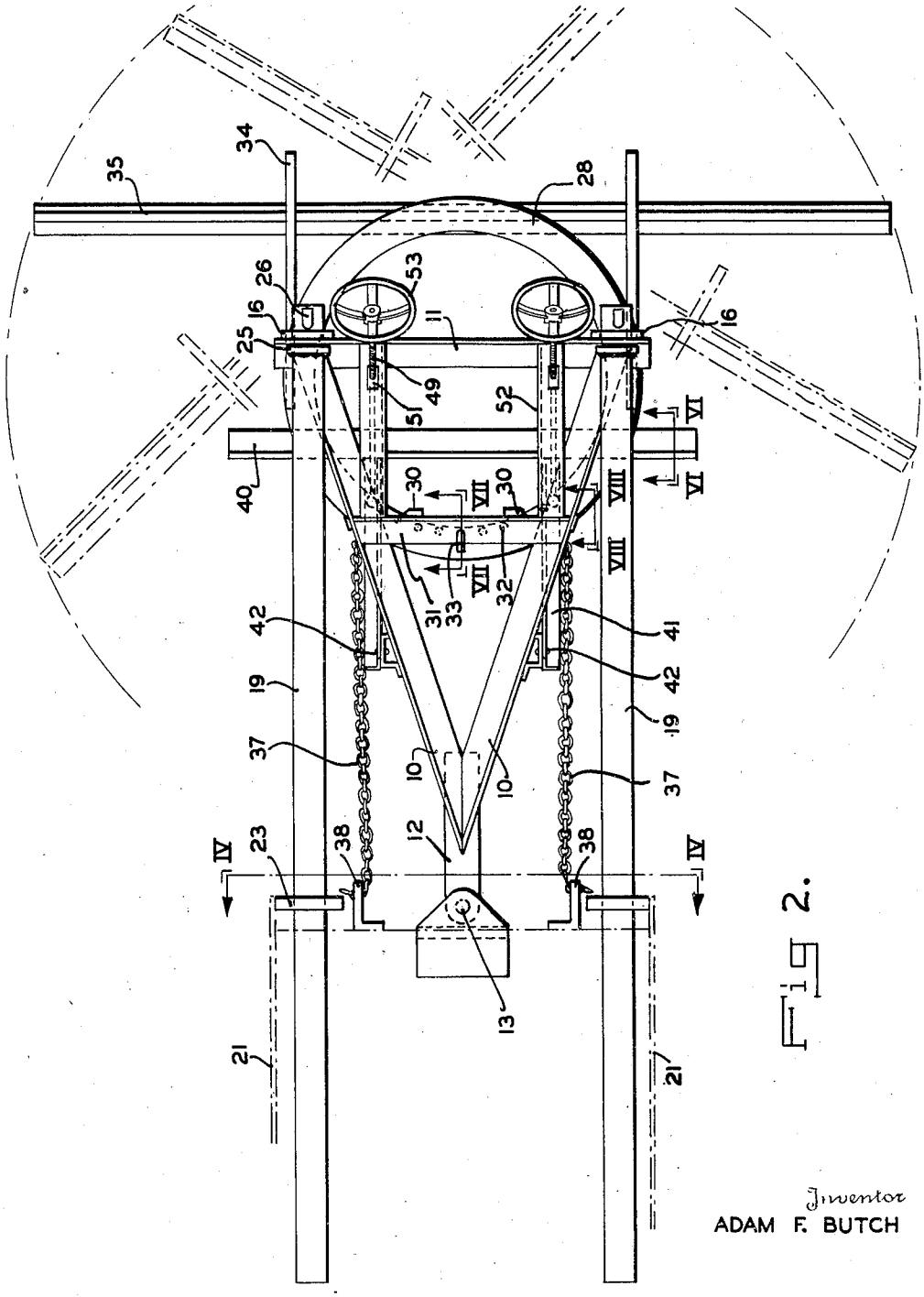


Fig 2.

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SUPPORT AND TRACTION OF IMPLEMENTS

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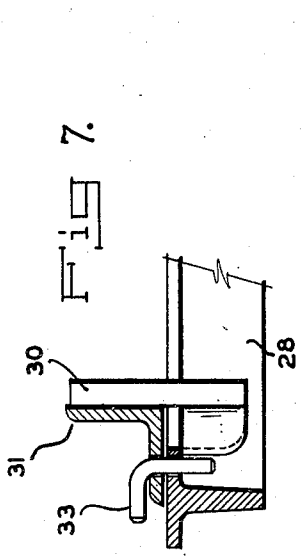


Fig 7.

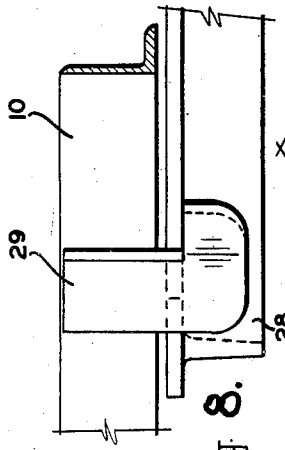


Fig 8.

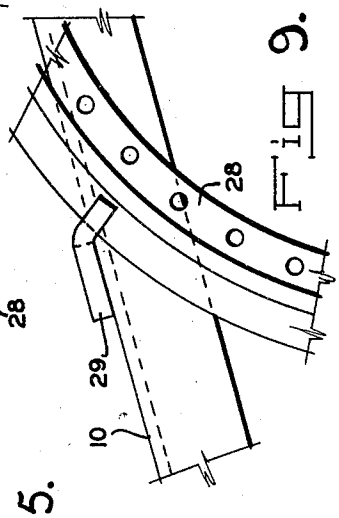


Fig 9.

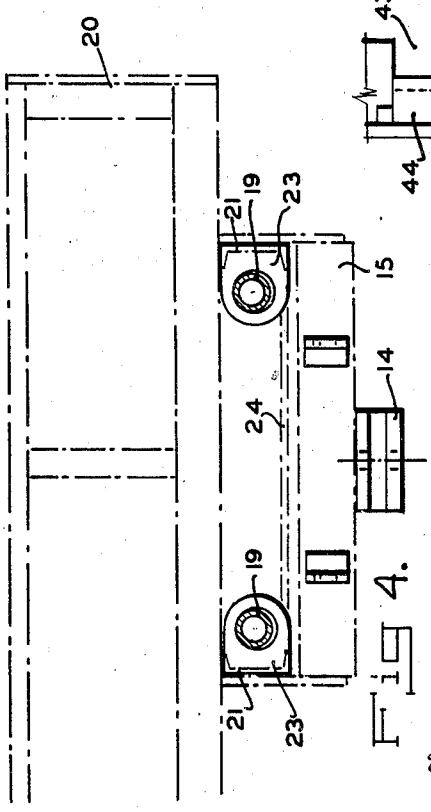


Fig 4.

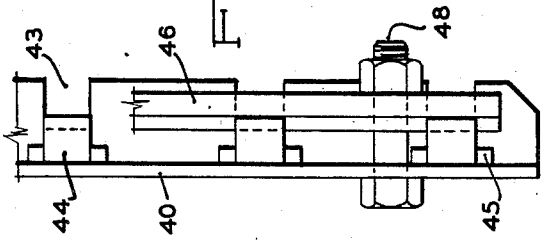


Fig 5.

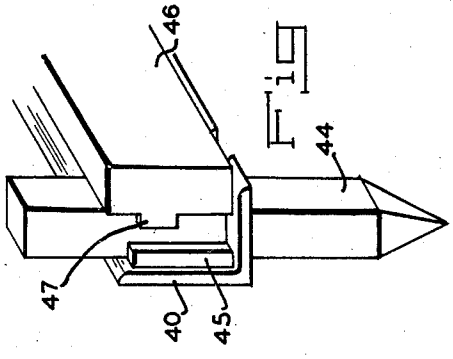


Fig 6.

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Patented July 20, 1948 2,445,472

UNITED STATES PATENT OFFICE

2,445,472

SUPPORT AND TRACTION OF IMPLEMENTS

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Application August 24, 1944, Serial No. 551,042

6 Claims. (Cl. 37—156)

1

This invention relates to earth working apparatus and more particularly to an earth scraping and grading attachment having especial utility in connection with road construction and maintenance. More specifically, the invention is concerned primarily with an earth loosening, distributing and/or grading attachment which may be used in conjunction with a conventional motor truck of the load dumping type whereby the motive power of the truck may be advantageously and readily utilized in loading the attachment and in drawing the same over a predetermined course. It is accordingly the primary object of the invention to provide a unitary machine or attachment adapted to be used in conjunction with a conventional motor truck of the load dumping type which is operative to loosen, distribute and/or grade earth or other materials lying on the surface of the ground while the motive power of the truck is utilized to effect the operation of the machine or attachment.

A further and more general object of the invention is the provision of an improved and materially simplified apparatus for loosening or distributing or grading earth and other surface materials which may be advantageously employed in conjunction with conventional equipment normally required in road construction and maintenance operations in such manner that substantial economies may be effected in the carrying out of such operations.

Another object of the invention is the provision of a rugged and unitary attachment which may be connected onto the rear of a conventional motor truck of the load dumping type in such manner that the attachment is drawn forward by forward movement of the truck and forced downwardly by tilting movement of the load bearing body of the truck whereby the attachment may be employed in loosening, distributing, and/or grading the soil or other materials lying on the soil. Thus the invention provides a wholly practical arrangement whereby plows, scarifiers and scraper blades, for example, may be readily attached, in operative relation, to motor trucks of the load dumping type thereby widening the utility of more common equipment while decreasing the necessity of additional special equipment.

The above and other objects and advantages of the invention will become apparent upon consideration of the following detailed specification and the accompanying drawing wherein there is specifically disclosed a representative practical embodiment of the principles of the invention.

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In the drawing:

Figure 1 is a side elevation of a combined scarifier and road grader constructed in accordance with the principles of the invention, the view showing the combined apparatus as being attached to a conventional motor truck of the load dumping type;

Figure 2 is a plan view of the apparatus of Figure 1;

Figure 3 is a partial transverse section of the apparatus of Figures 1 and 2;

Figure 4 is a fragmentary rear end view, in schematic outline, of a conventional motor truck showing the parts which are secured to the truck to enable the apparatus of Figures 1 and 2 to be operatively attached thereto;

Figure 5 is a plan view of a portion of the scarifier blade assembly utilized in the apparatus of Figures 1 and 2;

Figure 6 is a perspective view of one of the teeth of the scarifier;

Figure 7 is a fragmentary section taken along the line 7—7 of Figure 2; and

Figures 8 and 9 are fragmentary side and bottom plan views, respectively, of a detail of the apparatus of Figures 1 and 2.

The particular apparatus illustrated comprises a rigid triangular-shaped frame having diverging side members 10 and a lateral connecting member 11. As shown, such members may be formed of conventional extra-heavy metal angle stock which in practice are properly welded together to form the rigid assembly. To the underside of the apex of the members 10 is welded or otherwise suitably secured a longitudinally projecting plate 12 which has an aperture in its forward end to receive a pin 13 removably held in a conventional trailer-hitch fitting 14 which, in turn, is securely fastened to the main frame 15 of a conventional motor truck. Secured to the vertical leg of the angle 11 is a pair of transversely spaced plates 16 each having an aperture 17 at its upper end and a hook 18 at its lower end. Such apertures are adapted to slideably receive the rear end portions of a pair of extra-heavy metal tube lengths 19 which project rearwardly from the motor truck or other vehicle with which the complete apparatus is to be used and, as will be more fully explained hereinafter these tubes 19 are provided for the purpose of supporting the apparatus when it is being transported from one location to the other and for the purpose of pressure loading the apparatus as is normally required when the apparatus is to be used for scarifying and grading

for example. In accordance with this invention the forward ends of the tubes 19 are detachably coupled with a tiltable member or part of the motor truck or other equipment and in the embodiment specifically illustrated such tiltable part is the load carrying body 20 of a conventional dump truck. As is well understood, such bodies are commonly supported on a separate frame comprising a pair of transversely spaced but longitudinally extending channels 21 and the frame thus provided is pivoted on the principal frame 15 of the motor truck as at 22 (Figure 3). Means, not shown, is commonly provided to lift the forward end of the body 20 thereby tilting the body about pivot 22 whereby the load will slide out the back end of the body. In preparing a motor truck of this type for use with the attachment of the invention I weld or otherwise suitably secure an apertured ear 23 to the rear end portion of each of the channels 21 of the body frame and to limit the downward movement of the forward end of the tubes 19 I secure the ends of a plate 24 to the upper surfaces of the lowermost of the inwardly directed flanges of the channels 21 as indicated in Figures 1 and 4. The apertures in ears 23 loosely receive the tubes 19 so that these tubes may be readily slid into and out of the sockets thus provided for them.

It will be observed that when the body 20 is in lowered or horizontal position the tubes 19 will be cantilevered outwardly for suspension of the frame 10, 11 as shown in full lines in Figure 1. To hold the tubes 19 in proper position a collar 25 is secured to each of them for abutment against the forward face of each of the plates 16 and an aperture is provided intermediate the collar and the rear end of each of the tubes to receive a readily retractable pin 26 which, when the parts are assembled, is on the opposite side of the plates 16. In assembling the parts the pins 26 are removed and the tubes 19 are slid forwardly in their sockets sufficiently to allow their rear ends to clear at plate 16 after which they are moved rearwardly to project their end portions through the plate 16 whereby the pins 26 may be inserted.

Swivably supported in depending position from the base portion of the triangular frame 10, 11 is a ring 28 preferably of a length of metal T section as shown in Figures 3 and 7. This ring is held in position below the frame 10, 11 by the hook portions 18 of the plates 16, by the hooks 29 which are rigidly secured to and extend downwardly from the angles 10, and by the hooks 30 which are rigidly secured to and extend downwardly from an angle member 31 which spans the members 10 as shown in Figure 2. Thus the ring 28 is operatively attached to the frame 10, 11 but is free to rotate with respect to this frame upon its own principal axis. The horizontal flange of the ring 28 is provided with a series of circumferentially spaced apertures 32 to receive the pin 33 extending down through an aperture in the angle 31 whereby the ring 28 may be locked in the selected angular position. Welded or otherwise rigidly secured to the outer surface of the vertical web of the ring 28 and positioned on either side of the ring is a pair of rearwardly and downwardly curved plates 34 to the lower portion of which is secured a scraper blade 35. In accordance with usual practice, this blade may be provided with a replaceable hardened steel cutting edge member 36. It will be understood that by rotating ring 28 with respect to the frame 10, 11 the angularity of the blade 35 with respect to the direction of movement of the complete assembly may be varied as desired whereby the materials accumulated in front of the blade when in use may be moved to the right or the left as desired.

Referring to Figure 1 which shows the apparatus attached to the rear of a conventional motor truck of the load dumping type in the manner explained above, it will be observed that if the body 20 of the truck is in lowermost or horizontal position the cantilevered tubes 19 hold the frame 10, 11 and ring 28 in elevated position whereby the blade 35 including the edge 36 is held above the surface of the ground or roadway on which the truck is supported. In this position the complete apparatus may be readily transported from one location to another. When it is desired to employ the attachment apparatus as an earth scraper or road grader it is only necessary to operate the body lifting or load dumping apparatus of the motor truck for a short time to effect a one or two foot rise in the front end of the load bearing body. Such dumping apparatus is in common use and whether of the mechanical or of the hydraulic type is provided with a locking arrangement to hold the body in any desired angular position. Upon the body 20 being tilted the plate 24 rises to engage the undersides of the forward ends of the tubes 19. Thereafter these tubes act as levers of the third class with downward thrusts being applied through the ears 23 and upward thrusts being applied through the plate 24. This action forces the rear ends of the tubes 19 downwardly and applies a heavy downward force to the blade 35 causing the same to dig into the surface of the ground a distance determined by the hardness of ground and the extent to which the body 20 is tilted. This pressure loading, however, is resilient due to the action of the main suspension springs of the motor truck which, of course, are relieved to the extent of the downward thrust imparted to the blade 35. Thus breakage of parts due to an inadvertent tilting of the body 20 beyond a predetermined or desired extent is avoided. In practice, I have found that better results can be attained if the body 20 is partially filled with heavy material. In a conventional dump truck of average capacity this load may consist of 1½ or 2 tons of stone or other heavy road building materials. This load is advantageous in providing sufficient downward thrusts for the blade 35 while providing a sufficient load to insure adequate traction at the driving wheels of the vehicle whereby the blade 35 may be drawn through the earth or other materials to accomplish its intended function.

To assist the tubes 19 in preventing sidewise movement of the attachment about the draw pin 13 I provide a length of chain 37 on either side of the apparatus each having one of its ends securely fastened to one of the frame members 10 and the other of its ends secured in a keyhole slot formed in the member 38 which is welded or otherwise securely fastened to the frame of the motor truck. In this manner the attachment is kept longitudinally aligned with the direction of travel of the truck and the maintenance of this alignment is important particularly when the blade 35 is fixed in angular relation with respect to such line of travel. An important feature of the invention is the ease and facility with which the attachment of the invention may be adjusted and connected to or disconnected from the motor truck. When in suspended position as shown in full lines in Figure 1 only the weight of the ring

28, arms 34 and blade 35 is on the hooks 18, 29 and 30 so that upon the withdrawal of the pin 33 the ring 28 may be readily rotated to desired position by a single operator. To detach the equipment from the truck the body 20 is slightly tilted by operation of the dumping mechanism to an extent just sufficient to "float" the forward ends of the tubes 19. Now upon withdrawal of the pins 26 the tubes 19 may be readily slid forwardly to clear the plate 16. Upon detachment of the chains 37 and withdrawal of pin 13 the motor truck can be moved ahead and away from the equipment after which the tubes 19 may be withdrawn. The reverse procedure is followed in connecting the equipment to the truck.

It is normally desirable to employ a scarifier ahead of the blade 35 and for this purpose I employ a transversely extending angle member 40 which is carried by the lower ends of a pair of spaced parallel struts 41 which are pivotally connected at their forward ends to the frame members 10 as at 42. Referring more particularly to Figures 5 and 6 the horizontal leg of the angle 40 is notched at spaced intervals as at 43 to receive the teeth 44. These latter are preferably square and are sharpened at their lower ends. To hold the teeth in position blocks 45 are welded to the inner face of the vertical web of the channel 40 to engage the opposite side surfaces of the teeth 44 and to clamp the teeth against this face I provide the bar 46 which is substantially coextensive with the angle 40 which is provided with a continuous rib 47 for engaging within transverse slots formed in one side of each of the teeth. Spaced bolts 48 clamp angle 40 and bar 46 together thus securely retaining the teeth 44. The depth of cut of the scarifier thus described is determined and maintained by the bar of screws 49 which are pivotally connected at their lower ends to the struts 41 as at 50. Screws 49 have screw-threaded connection with rotatable locks 51 secured in struts 52 extending longitudinally between the frame members 11 and 31 and carried thereby. To the upper end of each of the screws 49 is keyed a hand wheel 53. It should be apparent that upon rotation of the wheels 53 in one direction the teeth 44 of the scarifier will be moved downwardly with respect to the blade 35 while upon rotation in the opposite direction the teeth will be raised with respect to the blade. In this manner the depth of penetration of the scarifier teeth may be readily maintained and adjusted.

While I have specifically described my invention in connection with an earth scarifying and grading apparatus it should be understood that the broader principles of the invention are equally applicable to other specific uses—for example, to the support and operation of a plow and to the support and operation of a road marking unit, these various instrumentalities being carried by a frame supported by and attached to a motor truck in the manner described and illustrated herein in connection with the frame 10, 11. Likewise, it will be readily apparent that the grading attachment illustrated herein may be employed in distributing or moving earth or other materials by pushing as would be accomplished by operating the truck in a reverse direction. Further, it should be understood that the specific structures illustrated and described herein are exemplary only as obviously many changes may be made therein without departing from the spirit or scope of the invention. Reference

should therefore be had to the appended claims in determining the scope of the invention.

What I claim is:

1. An attachment for a conventional motor truck of the load dumping type having a load carrying body pivotally supported at its rear end comprising a frame adapted to have its forward end connected to the frame of said truck, an earth working implement carried by said frame, and means to support the rear end of said frame and to force said rear end downwardly whereby said implement may be forced into engagement with the earth comprising a third-class lever arm carried by and movable with said body in rotating about said pivotal support, said arm projecting rearwardly of said truck and having its rear end portion secured to the rear portion of said frame.

2. An attachment for a conventional motor truck of the load dumping type having a load carrying body pivotally supported at its rear end comprising a frame adapted to have its forward end connected to the frame of said truck, an earth working implement carried by said frame, a socket carried by said body and adapted to slideably receive a third-class lever arm, said arm extending longitudinally rearward of said truck and body and being adapted to rotate with said body about said pivotal support, and means to connect the rear end portion of said arm with a rear portion of said frame, the arrangement being such that when said body is in lowered or horizontal position said implement is suspended above the surface of the ground while upon the lifting of the forward end of said body a predetermined distance said implement is forced down into the surface of the ground.

3. An attachment for a conventional motor truck of the load dumping type having a load carrying body pivotally supported at its rear end comprising a frame adapted to have its forward end connected to the frame of said truck, an earth working implement carried by said frame, longitudinally extending sockets provided in said body and positioned immediately inward of the spaced parallel body frame members located immediately below the floor of the body, an elongated arm slideably received in each of said sockets and projecting rearwardly of said truck and body whereby upon pivotal movement of said body about said pivotal support the rear or free ends of said arms move upwardly or downwardly, and means to attach the rear end portions of said arms to a rear portion of said frame.

4. Apparatus according to claim 3 further characterized in that said attaching means comprises a pair of transversely spaced members secured to and projecting upwardly from said rear portion of said frame, each of said members having an aperture to slideably receive said arms, and removable means on said arms to secure said arms against sliding movement in said apertures.

5. Apparatus of the character described comprising a frame adapted to be detachably connected at its forward end to the rear end of a conventional motor truck of the load dumping type having a load carrying body pivotally supported at its rear end on the rear end portion of said truck, an earth working implement secured to and depending downwardly from said frame, a pair of longitudinally extending but transversely spaced tubular steel booms, said booms adapted to be slideably received in sockets provided in said body, and means at transversely

spaced rear portions of said frame to secure said frame to the rear end portions of said booms.

6. An attachment for a conventional motor truck of the load dumping type having a load-carrying body pivotally supported at its rear end comprising a boom-like support adapted to be rigidly but detachably coupled with said body in rearwardly projecting relation therewith whereby upon upward tilting movement of said body the outer or rear end of said support will be moved downwardly, an earth working implement carried by said outer or rear end of said support in depending relation therewith, and means for tractively connecting said truck to said implement the arrangement being such that upon upward tilting of said body said implement may be forced into the surface of the earth while upon said body being lowered to horizontal position said implement is supported in a position above said surface to facilitate its transportation.

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